REMARKS

Upon entry of the present amendment, claims 1-13 will remain pending in the above-identified application and stand ready for further action on the merits.

The newly added claims do not incorporate new matter into the application as originally filed. Newly added claims 11-13 find support at page 9, lines 20- 22 of the specification. Accordingly, entry of the present amendment is respectfully requested.

Claim Rejections Under 35 USC §103(a)

Claims 1-10 have been rejected under 35 USC § 103(a) as being unpatentable over EP 1 020 501. Further, claims 1-4 and 6-10 have also been rejected under 35 USC § 103(a) as being unpatentable over EP 1 036 836. Reconsideration and withdrawal of each of these separate rejections is respectfully requested based upon the following considerations.

The Present Invention

The present invention provides a polishing composition which comprises polymer particles and inorganic particles in an aqueous medium. The inorganic particles are defined as colloidal silica and have an average particle size of from about 5 – 170 nm, and wherein the particle sizes are defined by $D_p \leq D_i + 50$ nm.

When colloidal silica particles in the 5 – 170 nm size range are used, the polishing rate is improved. Additionally, and in contrast to the '501 reference, when $D_p > D_i$ and/or $D_i \leq 100$ nm the polishing rate is not lowered.

In addition, the Applicants believe that the Examiner may not fully appreciate the unexpected advantages of the present invention. The Examiner asserts that since in the case of $D_p \geq D_i + 50$ nm the polishing rate is the same as or lower than in the case of $D_p \leq D_i + 50$ nm, that the effects of the present invention are not unexpected. However, the present invention does

exhibit unexpected effects in that the polishing rate is improved in comparison with a polishing composition that uses inorganic particles alone. In the case of $D_p \leq D_i + 50$ nm, the polishing rate is the same or lower in comparison with a polishing composition that uses inorganic particles alone.

Distinctions Over Cited Art

EP '501

The Examiner asserts that the EP '501 reference renders the present claims unpatentable for several reasons. The Examiner first asserts that this reference teaches a polishing slurry that comprises inorganic particles and polymer particles, wherein the inorganic particles are smaller than the polymer particles. The Examiner then takes the position that the use of "colloidal silica" in the presently claimed invention is encompassed by the EP '501 general reference to "silica." EP '501, paragraph 53. In the alternative, the Examiner asserts that the use of colloidal silica would be made obvious by EP '501 because this reference teaches silica that, while not colloidal, is colloidal in size.

EP '501 teaches a CMP slurry which contains polymer particles and inorganic particles, and wherein the mean particle size of the inorganic particles may be smaller than the mean particle size of the polymer particles. See EP '501, abstract. EP '501 mentions the use of "silica" in the description, but only discloses the use of fumed silica in the Examples.

The general reference to "silica" in paragraph 53 of EP '501 does not render obvious the use of colloidal silica. One skilled in the art would clearly understand that EP '501 is referring to "fumed silica" since that is the only substantive teaching with regard to silica in the application. In any event, the genus that the term 'silica" encompasses is so large in number, and encompasses such a wide variety of different materials, that one skilled in the art would not understand the reference to be teaching use of all forms of silica in their invention.

The Kirk-Othmer Encyclopedia of Chemical Technology describes the term "silica" as follows:

> The term silica denotes the compound silicon dioxide [7631-86-9], SiO_2, and encompasses its various forms, including crystalline silicas, eg quartz; microcrystalline silicas, eg, diatomaceous earth (see DIATOMITE); vitreous silicas, which are essentially supercooled liquid glasses; and amorphous silicas. The amorphous silicas vary over a wide range of hydration or hydroxylation. Silica sols (colloidal silicas) are nonsettling dispersions of amorphous silica particles in a liquid, generally water. Amorphous powders can be broadly classified as either wet process or pyrogenic silicas based on the mode of manufacture. Wet process types include precipitated silicas and silica gels. Pyrogenic silicas are made at high temperature rather than from aqueous solution, and are sometimes referred to as fumed silicas.

Kirk-Othmer Encyclopedia of Chemical Technology, Fourth Edition (1997) Volume 21, p. 977. This passage makes clear that the term "silica" is an extremely broad term that encompasses a wide variety of materials. It is unrealistic to assume that EP '501 teaches each and every one of these various forms of silica with a single mention of the term "silica."

In addition, in EP '501 it is taught that when $D_i \geq D_p$ and Di $\leq$ 100 nm, the polishing rate tends to be particularly low, in comparison with the case of $D_i < D_p$. See EP '501, paragraph [0057]. In the present invention, in the case of $D_i \geq D_p$ and Di $\leq$ 100 nm, the polishing rate is still good, as in the case of $D_i < D_p$. This is demonstrated by comparing present Example 5 with present Example 11. Therefore, since the effects described in EP '501, paragraph [0057] are inconsistent with the results obtained using the present compositions, it is clear that the silica taught in EP '501 is not colloidal silica, as recited in present claim 1. Thus, the relationship defined in present claim 1, of $D_p \leq D_i + 50$ nm, wherein the inorganic particles are colloidal silica, would not be suggested to one of skill in the art based on the teachings of EP '501.

It should also be noted that in EP '501 fumed silica is used in all of the working examples. Also, EP '501 refers to fumed silica as "silica" and colloidal silica as "colloidal silica"

in Table 1, page 13, and in Examples 2B and 3B, clearly distinguishing these types of silica from each other.

The Examiner further asserts that EP '501 teaches a fumed silica that is colloidal in size, and that this therefore renders colloidal silica obvious. In fact, EP '501 does not teach the use of colloidal silica that meets the particle size limitations set forth in claim 1. EP '501 merely mentions a very broad range for polymer particle size, up to 0.8 μm, and then mentions that the inorganic particles may be smaller in size. See EP '501 abstract. There is no specific teaching in EP '501 of silica particles, of any form, in the size range recited in the present application, and there is no teaching in EP '501 of silica particles that meet the size limitation with respect to the polymer particles as set forth in the present claim 1.

Even more importantly, fumed silica particles are known in the art to be of a completely different morphology than colloidal silica. In fact "[F]umed silicas have a chain-like particle morphology. In liquids, the chains bond together via weak hydrogen bonds forming a three dimensional network." *See Exhibit 1, Azom.com product information sheet.* It is well known in the art that fumed silicas form three-dimensional aggregates that tend towards a fairly large particle size. The Kirth-Othmer Encyclopedia of Chemical Technology explains: "[T]hey (fumed silicas) generally can contain a few hundred ultimate particles fused into branched-chain, three dimensional aggregates (54) (eg see Fig. 6). Pyrogenic (fumed) silicas in the 100 nm to 2 μm diameter particle size range are common." Kirth-Othmer Encyclopedia of Chemical Technology Fourth Edition (1997), vol. 21, p. 1026. In contrast, the colloidal silicas used in the present invention are said to be discrete particles, and generally have a somewhat smaller particle size. For example, Levasil 50CK is a colloidal silica that can be used in the present invention. See Applicant's Specification Table 1, page 25. Levasil 50CK is composed of "discrete spheres which are not cross-linked with one another." *See Exhibit 2, Levasil product information sheet.*

Therefore, it can be concluded that fumed silicas are known in the art to be three-dimensional aggregates of a generally somewhat larger size (≥ 100 nm) than the discrete,

colloidal silica particles of the presently claimed invention. Accordingly, fumed silicas are in fact very different from colloidal silicas, and are not encompassed by the '501 application. These differences account for the differences in surface smoothness, and polishing rates, previously shown between the present invention and EP '501. See Applicant's Amendment dated March 23, 2005, pages 8-10. Accordingly, it is respectfully requested that this rejection be withdrawn.

EP '836

At page 4 of the office Action, the Examiner has reinstated a 35 U.S.C. §103 rejection over EP 1 036 836 alone, or in view of Liu et al. and/or Ina et al. For the following reasons, this rejection is respectfully traversed.

The size of the inorganic particles taught in the Examples of EP '836 is 100 nm or less. Whereas it is taught in EP '501 that the polishing rate is lower when the size of the inorganic particles is 100 nm or less. Accordingly, the teachings of EP '836 and EP '501 are inconsistent with each other. One of skill in the art would not be able to arrive at the present invention by combining these references. It is respectfully requested that this rejection be withdrawn.

Newly added claims

It is respectfully submitted that newly added claims 11, 12, and 13 cover subject matter that is clearly allowable. Nowhere in the prior art is a polishing composition with these limitations mentioned. In fact, EP '501 nowhere mentions the use of colloidal silica in this particle size range.

CONCLUSION

Based upon the amendments and remarks presented herein, the Examiner is respectfully requested to issue a Notice of Allowance clearly indicating that each of the pending claims 1-13 are allowable at present.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John W. Bailey (Reg. No. 32,881)

at the telephone number below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: August 11, 2005

Respectfully submitted,

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Attachments:

Exhibit 1 - Azom.com product information sheet

Exhibit 2 - Levasil product information sheet

J. M.K.